

What is claimed is:

1. A laser-based measuring apparatus configured to divide a light beam from a laser light source into at least two light beams, pass the light beams through different optical paths from each other, recombine the light beams, have the light beams interfere with each other to generate interfered light, opto-electrically transduce the interfered light to an optical frequency, and measure the amount of travel of an object which changes an optical path length of a portion of an optical path based on the optical frequency, said measuring apparatus comprising:

a portion for generating at least two measuring light beams from the laser light source;

two reflection planes included in an object moving on a measuring axis, said reflection planes arranged back-to-back to each other on said measuring axis; and

an opposing incident optical system for directing said measuring light beams into said reflection planes, respectively, such that said measuring light beams oppose to each other on said measuring axis.

2. The laser-based measuring apparatus according to claim 1, wherein said reflection planes comprise reflectors mounted on the object.

3. The laser-based measuring apparatus according to claim 1, wherein said object is a cylinder having an axis of rotation

orthogonal to said measuring axis, and said reflection planes are side surfaces of said cylinder opposing to each other on a diameter.

4. The laser-based measuring apparatus according to claim 3, wherein said measuring apparatus comprises a plurality of said opposing incident optical systems.

5. A laser-based measuring method for measuring an amount of travel of an object which changes an optical path length of a portion of an optical path based on an optical frequency by dividing a light beam from a laser light source into at least two light beams, passing the light beams through different optical paths from each other, recombining the light beams, having the light beams interfere with each other to generate interfered light, and opto-electrically transducing the interfered light to the optical frequency, said measuring method comprising the steps of:

setting two reflection planes included in an object moving on a measuring axis, such that said two reflection planes are arranged back-to-back to each other on said measuring axis;

generating at least two measuring light beams from a laser light source; and

directing said measuring light beams into said reflection planes, respectively, such that said measuring light beams oppose to each other on said measuring axis.

6. The laser-based measuring method according to claim 5, wherein said reflection planes comprise reflectors mounted on the object.

7. The laser-based measuring method according to claim 5, wherein said object is a cylinder having an axis of rotation orthogonal to said measuring axis, and said reflection planes are side surfaces of said cylinder opposing to each other on a diameter.

8. The laser-based measuring method according to claim 7, wherein a plurality of opposing incident optical systems are provided.

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